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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/891,833	06/25/2001	Steven Verhaverbeke	004730	2675
32588	7590	02/14/2006	EXAMINER	
APPLIED MATERIALS, INC. 2881 SCOTT BLVD. M/S 2061 SANTA CLARA, CA 95050			TUROCY, DAVID P	
			ART UNIT	PAPER NUMBER
			1762	
DATE MAILED: 02/14/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/891,833

Applicant(s)

VERHAVERBEKE ET AL.

Examiner

David Turocy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS; WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 8-13 and 18-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8-13, 18, 23-25 and 39-42 is/are allowed.
- 6) ☒ Claim(s) 19-22 and 26-38 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                                                        |                                                                                         |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                                                       | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____                                                |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/19/2005 has been entered.

### ***Response to Amendment***

2. The applicant's amendments, filed 12/19/2005, have been fully considered and reviewed by the examiner. The examiner notes the amendments to claims 19, 23, 26, and 32. Claims 8-13, and 18-42 remain pending.

### ***Response to Arguments***

3. Applicant's arguments filed 12/19/2005 have been fully considered but they are not persuasive.

4. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

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The applicant has argued against the Nakata and McConnell references, stating the McConnell reference already discloses precise metering of the HF fluid and one would not be motivated to combine the teaching of Nakata and McConnell. The examiner respectfully disagrees. It remains the examiners position that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nakata to accurately measure a precise amount of HF in a controlled volume of water stream during a semiconductor cleaning process as suggested by McConnell et al. to provide a desirable precise volume of fluid into another fluid, i.e. concentration because Nakata discloses accurately delivering a known volume of one fluid into another fluid is known in the art to provide accurate, reproducible volume of fluid within a delivery stream and therefore would reasonably be expected to successfully provide accurate concentrations during a semiconductor cleaning process. Please note that the test of obviousness is not an express suggestion of the claimed invention in any or all references, but rather what the references taken collectively would suggest to those of ordinary skill in the art presumed to be familiar with them (*In re Rosselet*, 146 USPQ 183).

In addition that applicants argue against the Nakata and McConnell reference stating the references fail to teach of a pressurized chamber, however, the examiner respectfully disagrees. The chamber inherently has a pressure and therefore the chamber would inherently be "pressurized" to a degree.

The applicant has argued against the Blades reference, stating the reference fails to suggest splitting one system into two and states the examiners reliance on case law (*Ex parte Rubin*, 128 USPQ 440 (Bd. Pat. App. 1959)) is unsupported because in

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actuality the splitting exists in splitting one valve into two valves, i.e. structural rather than splitting process steps. Such an argument is persuasive and therefore the reliance on such case law has been withdrawn.

All other arguments are moot because they are directed to newly added limitations which are discussed in view of the rejections set forth below.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 19-21, 26-27, and 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 3045702 by Nakata in view of McConnell et al.

Nakata discloses a method of accurately reproducing volume of fluid from one fluid stream to another (Column 1, lines 9-11). Nakata discloses flowing a chemical into a 6 port-valve system with a tube (25) of known volume, filling the tube to generate a measured amount of chemical approximately equal to the known volume of the tube (Figure 3, Column 5, lines 44-46). Nakata discloses changing the valve system from charging to discharging, and visa versa, by performing a single change of state of the multi-port valve (Column 2, lines 27-53). While the examiner notes Nakata uses gas chemicals to illustrate the valve system, Nakata discloses the valve relates to a fluid sampling apparatus, and therefore one of ordinary skill in the art at the time of the invention would reasonably expect the valve system as disclosed by Nakata to effectively reproduce accurate volumes of one fluid within another fluid.

Nakata fails to disclose applying the measured amount of chemical in a known measured concentration to a semiconductor wafer in a single semiconductor wafer etching or cleaning process.

However, McConnell et al. discloses accurately control the amount of HF that is injected into a water flow stream in order deliver precise concentrations of HF to the semiconductor cleaning process (col. 12, lines 9-62). McConnell et al. additionally teaches the steps of flowing DI water into pushing the measured amount of chemical into a chamber, which inherently has a pressure and therefore is "pressurized", continuing to flow said DI water (and chemical) into said chamber until a predetermined level is reached in said chamber. McConnell discloses controlling the amount of DI

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water utilized to provide precise control over the flow rate, i.e. volume, in order to provide precise concentration of chemicals (col. 12, lines 9-62).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nakata to accurately measure a precise amount of HF in a controlled volume of water stream during a semiconductor cleaning process as suggested by McConnell et al. to provide a desirable precise volume of fluid into another fluid, i.e. concentration because Nakata discloses accurately delivering a known volume of one fluid into another fluid is known in the art to provide accurate, reproducible volume of fluid within a delivery stream and therefore would reasonably be expected to successfully provide accurate concentrations during a semiconductor cleaning process.

Claims 21 and 31: Nakata in view of McConnell et al. lacks a teaching of the use of a 6-port valve in its valve system. McConnell et al. states in col. 6, lines 59-65 that "various multiport two- or three-position valves may be substituted in the loop for certain groups of two or more valves shown in the figures." McConnell et al. also states with regard to Figure 5, "a five port, four way valve may also be used in place of the two three port, 2 position valves" (col. 12, lines 44-46). Therefore, McConnell et al. suggests the replacement of numerous smaller valves with multi-port valves and visa versa. It would have been obvious to replace a 6-port valve with two 3-port valves with the expectation of equivalent results since it is known that a 6-port valve may perform the same as two 3-port valve in succession.

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Claim 29: Nakata in view of McConnell et al lacks a teaching of applying the mixed chemical solution to a spinning wafer. McConnell et al. teaches a desire to provide uniform exposure of the wafer(s) treated to the cleaning solution in the process of its invention. It is well known in the semiconductor manufacturing art that spinning of wafers immersed in a treatment solution ensures that all areas of the semiconductor wafer are exposed equally to the treatment solution. It would have been obvious for one having ordinary skill in the art to have spun the semiconductor wafer(s) while immersed in the various cleaning solutions in Nakata in view of McConnell et al.'s process in order to equally expose all areas of the wafer(s).

7. Claims 22 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 3045702 by Nakata in view of McConnell et al as applied to claims 19, 23, and 26 above, and further in view of US Patent 4243071 by Shackelford.

Nakata in view of McConnell teaches all the limitations of these claims as discussed above in the 35 USC 103(a) rejection, however, they fail to disclose changing the amount of chemical used by changing the volume of said tube.

However, Shackelford, teaching of a method for retaining precise amount of liquid using a valve, discloses interchanging the tube to change the volume of the reservoir (Abstract, Column 5, lines 9-13).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Nakata in view of McConnell to interchange the tube to



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change the volume of chemical retained within the tube as suggested by Shackelford to provide a desirable precise amount of chemical in semiconductor cleaning process because Shackelford discloses changing the tube to change the volume of a chemical is known in the art to retain different volumes of fluid using the same valve and therefore would reasonably be expected to effectively provide different concentrations using the same valve in a semiconductor cleaning process.

8. Claims 32-38 are rejected under 35 U.S.C. 103(a) as being unpatentable by US Patent 3291347 by Blades in view of US Patent 4243071 by Shackelford.

Blades teaching a method of mixing chemicals comprising the steps of flowing a first and second chemical into first and second tubes with known volumes to generate a measured amount of first and second chemicals (Figure 6). Blades discloses flushing the first measured amount with the second chemical and the second measured amount with the first chemical into an exhaust unit with a single reservoir (Figure 6). Blades discloses the second fluid is adapted to be carefully metered, i.e. have a known volume, to provide precise dilution (Column 4, lines 62-66).

Blades discloses a process within a single valve and fails to teach of two separate valve systems, 6-port and 3 port valves, however, Blades discloses mixing fluids using 6 port valves and 3 port valves, therefore separating the process of Blades into two steps, using any combination of 6-port and 3 port valves, would have been obvious to one of ordinary skill in the art because Blades teaches using 6-port valves

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and 3 port valves to mix fluids and therefore using any combination of 6-port valves and 3 port valves would reasonably be expected to effectively mix two chemicals together.

Blades fail to disclose providing a tube external to the valve to measure the fluid.

However, Shackelford, teaching of a method for retaining precise amount of liquid using a valve, discloses providing the precise measured tube external to the valve (figures). Shackelford discloses by providing an external tube it allows for interchanging the tube to change the volume of the reservoir (Abstract, Column 5, lines 9-13).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Blades to provide an external tube as suggested by Shackelford to provide a desirable precise amount of chemical in a mixing process because Shackelford discloses an external tube allows for changing the tube to change the volume of a chemical is known in the art to retain different volumes of fluid using the same valve and therefore would reasonably be expected to effectively provide different concentrations using the same valve in the chemical mixing process of Blades.

### ***Allowable Subject Matter***

9. Claims 8-13, 18, 23-25, and 39-42 allowed.

10. The following is a statement of reasons for the indication of allowable subject matter:

Claims 8-13, 18, and 39-42: These claims are allowable for the reasons set forth in the office action dated 9/14/2005.

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Claim 23: None of the prior art cited or reviewed by the examiner teaches pushing a chemical out of a tube by using an inert gas and then subsequently separating the liquid chemical and the inert gas using a hydrophobic membrane.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Turocy whose telephone number is (571) 272-2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David Turocy  
Au 1762



**TIMOTHY MEEKS**  
**SUPERVISORY PATENT EXAMINER**